

# FILTERSORB<sup>®</sup> SP3

## BOILER WATER TREATMENT

### THE GREEN TECHNOLOGY



## BEST BOILER TECHNOLOGIES

"Best" means most effective for the protection of health and environment

"Boiler" FILTERSORB<sup>®</sup> SP3 Systems are installed and successfully used worldwide, in thousands of Heat Exchanger, Hot-Water boilers, Steam boilers or steam generating Distillation Plants.

**First** FILTERSORB<sup>®</sup> SP3 reduces corrosion or stops it entirely. Existing rust deposits are partially dissolved.

**Secondly** FILTERSORB<sup>®</sup> SP3 reduces scale deposits and blow down. It clears the scale in the boilers if used properly and this scale is flushed out with the blow down.

**Thirdly** FILTERSORB<sup>®</sup> SP3 stops or reduces the process of fouling in the heat exchangers.

"Technologies" includes "Nucleation Assisted Crystallization" (NAC) technology in the way it is designed, installed, built, maintained, operated and commissioned. This is a green technology without using salt, magnets, electric or template devices.

NAC is a trademark of Watch<sup>®</sup> Water ([see more on NAC](#))

## Boiler Water Treatment

Whether Softened water, Reverse Osmosis water or City Water is used for Boiler make up, Rest hardness stabilization, corrosion control and dispersion of solids - are absolutely necessary to treat with **Biodegradable Chemicals**, without using Phosphates, EDTA or NTA. Harmful substances which are present in boiler water are sodium compounds of chloride and sulfate, and temporary hardness of Calcium and Magnesium dissolved in carbon dioxide. Also oxygen is present in feed water. Any metals like Iron, Manganese or Copper enters into the boilers to magnify the existing problems further.

1. <b>BBT</b>	for	adding no	Sodium in Boiler water
2. <b>BBT</b>	for	adding no	Harmful substances in water
3. <b>BBT</b>	for	reduction of	Scaling problems.
4. <b>BBT</b>	to	reduce	the risk of corrosion due to Sodium Chloride (NaCl) in water
5. <b>BBT</b>	to	reduce	Biological growth
6. <b>BBT</b>	to	reduce	<b>Scale inhibitors</b> <b>Corrosion inhibitors</b> <b>Dispersants</b>
7. <b>BBT</b>	is	replacement of	<b>Harmful Ion-Exchange water</b>



Scale Prevention System with **FILTERSORB SP3** Media inside.

### Environmentally Safe, Non-toxic **ISOFT®** Products

#### Cost reduction Comparison

Conventional Chemicals

vs.

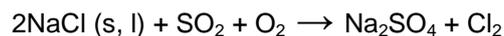
**ISOFT®**

*\*To see the cost comparison please visit our website [www.watchwater.de](http://www.watchwater.de)*

### Scale Prevention, Corrosion Control and Oxygen Scavenger includes dispersant

#### Corrosion by Sulfation of chloride salts in Boilers

The effects of Sodium Chloride salts on corrosion have been observed and there is an overwhelming consensus that chloride area a major factor of corrosion either in gas phase active oxidation or at low temperature oxidation. The deposition of sulfates and chlorides occurs by condensation and/or from attachment of particles, which may contain sulfates and alkali chlorides. Analysis of deposits has shown that the outer layers of the protective oxide scales contain metal sulfates such as  $\text{CaSO}_4$ ,  $\text{Na}_2\text{SO}_4$ ,  $\text{K}_2\text{SO}_4$ ,  $\text{PbSO}_4$  and  $\text{ZnSO}_4$  while the inner scales contains metal chlorides like  $\text{CaCl}_2$ ,  $\text{KCl}$ ,  $\text{PbCl}_2$ , and  $\text{ZnCl}_2$ . The formation of sulfates in the deposit is believed to be due to the sulfation of the alkali chlorides in the deposit and is believed to occur at the outer surface of the deposit. Deposited metal chlorides react with gaseous  $\text{SO}_2$  and /or  $\text{SO}_3$  forming condensed alkali sulfates, as shown by equations,

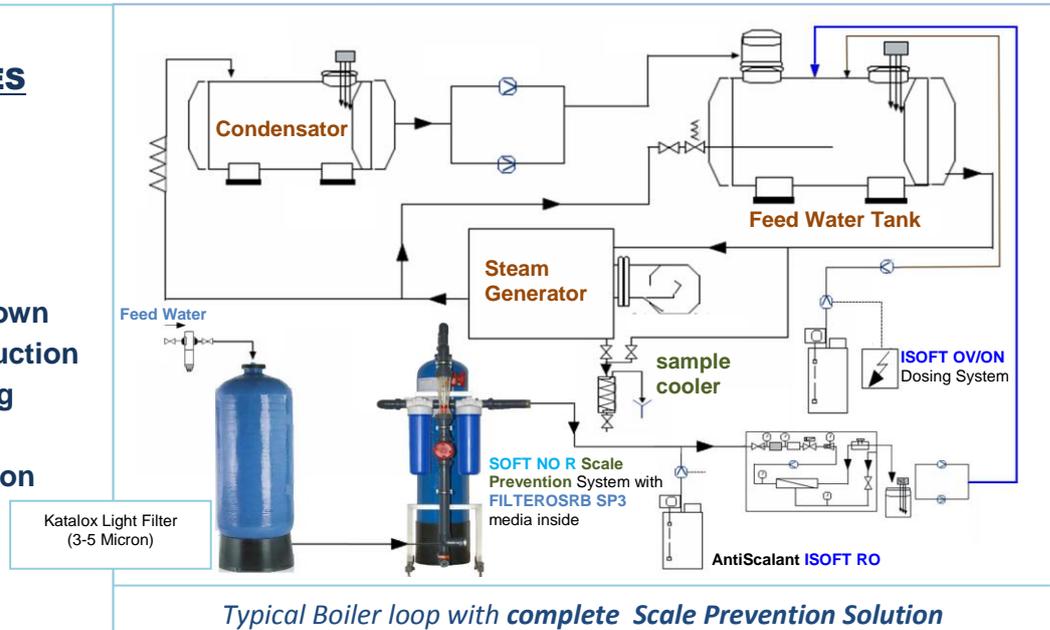


This reactions release gaseous chlorine that diffuses towards the metal/oxide interface creating a net reaction that lead to a continuous transport of metal from the metal/oxide interface towards a higher oxygen partial pressure. Therefore, after sulfation the reaction mechanism is similar to that of active oxidation.

**Calcium Sulfate ( $\text{CaSO}_4$ )** : Calcium sulfate precipitates forming a hard scale if the solubility at a given temperature is exceeded. For example, at  $40^\circ\text{C}$  the solubility is 1551 ppm, at  $100^\circ\text{C}$  the solubility is 1246 ppm and at  $220^\circ\text{C}$  the solubility is 40ppm. Calcium Sulfate has inverse solubility (becomes less soluble as the temperature increases) causing deposition problems. This negative solubility characteristic makes it more prone to crystallize where the heat is greatest; principally in the fire box where the highest heat concentration occurs. **Normal acids have no effect in dissolving this scale.**

### ADVANTAGES

- No Sodium
- No Phosphates
- No EDTA
- No NTA
- Limiting Blowdown
- Blowdown Reduction
- Reduce cleaning
- Passivation
- Reduce Corrosion

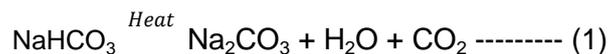


**NO CHEMICALS RELEASED INTO ENVIRONMENT**

## Scale & Deposits Prevention

Deposit is a major problem in the Hot Water and steam generating equipments. Boiler feed water pretreatment have advanced to such an extent that it is now possible to provide boilers with **FILTERSORB<sup>®</sup> SP3** water, combined with only ONE SHOT dosing as for Hot Water **ISOFT<sup>®</sup> ON** and for Steam Boilers **ISOFT<sup>®</sup> OV**. Most boiler systems have Sodium based Ion Exchange water softeners to Reverse Osmosis make up water, but even water of this purity does not provide deposit-free operation. Therefore good Environment Friendly internal boiler water treatment is an absolute necessity. Scale and Deposits are formed in boiler that includes,  $\text{Na}_2\text{CO}_3$ ,  $\text{CaSO}_4$ ,  $\text{Na}_2\text{SO}_4$ , Copper, Aluminum, silt and to extreme extent  $\text{Na}_2\text{SiO}_3$ . Other effects are pH decrease and corrosion of Iron and Copper piping. Scale which is formed by salts are always in soluble form and precipitate when concentrated by evaporation of solute water.

## Corrosion by Water Softeners



**This first reaction** is processed in boilers using Sodium based water softeners. The net results are release of 0.79 ppm of carbon dioxide for each parts per million (ppm or mg/liter) of Sodium bicarbonate as  $\text{NaHCO}_3$ . As the steam is condensed, carbon dioxide dissolves in water and depresses the pH by increasing hydrogen ion concentration as shown in the following sequence,



Carbonic acid promotes the iron corrosion reaction by supplying a reactant  $\text{H}^+$  and the overall reaction is



Low pH causes a generalized loss of metal rather than the localized caused by oxygen corrosion. The combination of adding sodium ions in water, contributes to formation of scale as Sodium Carbonate in hot water boilers and Sodium Silicate and Sodium Iron-Silicate in Steam boilers.

## **FILTERSORB<sup>®</sup> SP3**

Calcium Carbonate crystals precipitated through **FILTERSORB<sup>®</sup> SP3** (as described often in the literature) are non soluble in water, hard, dense and have tendency to attract silica in water and then sink towards the bottom of the boiler, and when sinking process starts other particles present in the boiler water can bound to  $\text{CaCO}_3$  seed crystals. All non-bound crystals can also be captured in a network of bound crystals. This confines particles to the bulk water as much as possible until that settled in the blow down drum where they are washed away regularly.

		<b>PAST</b>			versus	<b>ISOFT®</b>		
		Products				ALL IN ONE		
		Combination		Biodegradable	Toxic		Biodegradable	Toxic
<b>A</b>	Phosphates	<b>A</b>		<b>NO</b>	<b>YES</b>	*No Phosphates	-	-
<b>B</b>	Polymers	<b>A/B</b>		<b>NO</b>	<b>YES</b>	*No Polymers	-	-
<b>C</b>	Tanins	<b>A/B</b>	<b>C</b>	<b>NO</b>	<b>YES</b>	*No Tanins	-	-
<b>D</b>	EDTA	<b>A/B</b>	<b>D</b>	<b>NO</b>	<b>YES</b>	*No EDTA	-	-
<b>E</b>	NTA	<b>B/E</b>		<b>NO</b>	<b>YES</b>	*No NTA	-	-
<b>F</b>	Sodium Sulfide	<b>A/F</b>	<b>B</b>			<b>ISOFT® ON</b>	<b>YES</b>	<b>NO</b>
<b>G</b>	CHZ	<b>A/B</b>	<b>G</b>			<b>ISOFT® OV</b>	<b>YES</b>	<b>NO</b>

\*To know more about **ISOFT® Products** visit [www.watchwater.de](http://www.watchwater.de)

component ⇒	<b>I</b>	<b>SOFT</b>	<b>ON</b>	<b>OV</b>
<b>ISOFT® ON</b>	Corrosion Inhibitor	Dispersant	Non-volatile Oxygen Scavenger	-
<b>ISOFT® OV</b>	Corrosion Inhibitor	Dispersant	-	Volatile Oxygen Scavenger

**FILTERSORB® SP3** water with combination of **INSTANT ISOFT® OV/ON** products have solved these problems of scale, corrosion, pitting, and using Toxic and hazard chemicals and salts. It is proven in thousands of systems running world-wide that soluble salts cannot damage or form scale on the inner surface of pipes, Cooling towers, Heat exchangers, Hot water as well as Boiler systems. This is absolutely true for applications in Drinking water, Industrial water and also for every commercial applications. Nowadays **FILTERSORB® SP3** is even used for bottled water plants, which are used by water companies to stabilize the pH value and keeping all precious minerals in Drinking water. Water can be used where concentrations of salts are even up to 50000 TDS to avoid any scale in the heat exchangers used in the system.

<b>Products recommended for complete Scale Prevention in Boiler Water Treatment</b>			
Products	Packaging	Order Nr.	Web link
<b>FILTERSORB® SP3</b>	Packed in 60 liters drum: Mass 50 kg		<a href="#">Filtersorb SP3</a>
<b>Katalox Light®</b>	Packed in 28 liters bag: Mass 30 kg		<a href="#">Katalox Light</a>
<b>Contact Water Meter</b>	Available from ¾" up to DN150		<a href="#">Water Meter</a>
<b>Dosing System</b>	Available in 100 liters, 200 liters and 300 liters capacity		<a href="#">Dosing System</a>
<b>INSTANT ISOFT® OV</b>	Packed in 4 x 5 kg Boxes		<a href="#">ISOFT OV</a>
<b>INSTANT ISOFT® ON</b>	Packed in 4 x 5 kg Boxes		<a href="#">ISOFT ON</a>
<b>INSTANT ISOFT® RO</b>	Packed in 4 x 5 kg Boxes		<a href="#">ISOFT RO</a>

\*Please visit our website [www.watchwater.de](http://www.watchwater.de) for detailed information about each product.



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